

Examiner Chester T. Barry  
AppIn. of Redmon et al.  
Ser. No.: 10/667,893  
Response of 8/17/2005

### Claims Listing

1       1. (Currently Amended) A method of controlling a biological wastewater  
2       treatment process, comprising:

3           A. in at least one treatment tank containing wastewater, conducting  
4           a biological process supported, at least in part, by introducing  
5           oxygen-containing gas into the wastewater in the form of bubbles  
6           provided in the wastewater by a gas supply system, and causing at  
7           least a portion of the oxygen in said bubbles to dissolve in the  
8           wastewater and at least a portion of the dissolved oxygen to be  
9           consumed by the biological process

10           1. wherein the oxygen so dissolved may represent an excess  
11           or a deficiency relative to the oxygen consumed by the  
12           biological process, and

13           2. wherein at least one gas collection member is positioned in  
14           the treatment tank to receive offgas representing gas from said  
15           bubbles that has not been dissolve[[e]]d into the wastewater;

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16        B. controlling the operation of the biological process with a control  
17        system that, as the process operates, exercises continuing control  
18        over the process at least partially in response to measurements, that  
19        are taken by the control system from the offgas collected in the gas  
20        collection member and that are correlative with the amount of one or  
21        more gases in the offgas; and

22        C. [[,]] utilizing data obtained through said measurements to  
23        provide, in the control system, for the varying amounts of  
24        consumption of oxygen that occur in the biological process, control  
25        values, or components of control values, that change in response to,  
26        while remaining correlative with, such varying amounts of oxygen  
27        consumption, and generating control signals based on the changing  
28        control values or components.

1        2. (Currently Amended) A method of controlling a wastewater treatment  
2        process, comprising:

3        A. in at least one treatment tank containing wastewater, conducting  
4        a biological process comprising suspended growth aeration in which  
5        biological breakdown of suspended and/or dissolved waste material

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6        present in the wastewater is supported, at least in part, by  
7        introducing oxygen-containing gas into the wastewater in the form of  
8        bubbles provided in the wastewater by a gas supply system, which  
9        bubbles rise through at least a portion of the depth of the wastewater  
10      in the direction of its upper surface, and causing at least a portion of  
11      the oxygen in said bubbles to dissolve in the wastewater and at least  
12      a portion of the dissolved oxygen to be consumed by the biological  
13      process

14            1.    wherein the oxygen so dissolved may comprise an excess  
15            or represent a deficiency relative to the oxygen consumed by  
16            the biological process, and

17            2.    wherein at least one gas collection member is positioned to  
18            receive offgas representing gas from said bubbles that has not  
19            been dissolve[[e]]d into the wastewater;

20            B.    controlling the operation of the process with a control system  
21            that, as the process operates, exercises continuing control over the  
22            introduction of wastewater into the process and/or over the quantity  
23            of gas discharged into the tank through said gas supply system, at  
24            least partially in response to measurements of the offgas, taken by

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25                   the control system, that are correlative with the amount of one or  
26                   more gases in the offgas; and

27                   C.   utilizing data obtained through said measurements to provide, in  
28                   the control system, control values which are at least in part  
29                   correlative with changing needs for the supply of dissolved oxygen to  
30                   the wastewater as determined by the control system at least partly on  
31                   the basis of such data.

1                   3. (Original) Control system apparatus for controlling a biological  
2                   wastewater treatment process, comprising:

3                   A.   at least one gas collection member, positioned in at least one  
4                   wastewater processing tank in which the biological process is  
5                   conducted, to collect from the wastewater in the processing tank,  
6                   offgas representing at least a portion of oxygen-containing gas that  
7                   has been introduced into but not dissolved in the wastewater,

8                   B.   at least one measuring device comprising at least one gas  
9                   detector that is connected with the gas collection member and that  
10                  can take measurements and thereby provide data indicative of the

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11                   amount of at least one gas in the offgas collected by the gas  
12                   collection member, and

13                   C. at least one controller which is connected with the measuring  
14                   device, which defines, for the varying amounts of consumption of  
15                   oxygen that occur in the biological process, control values, or  
16                   components of control values, that change in response to, while  
17                   remaining correlative with, such varying amounts of oxygen  
18                   consumption, which controller generates control signals based on the  
19                   control values or components.

1                   4. (Currently Amended) A control system for controlling wastewater  
2                   treatment apparatus of the type that comprises at least one tank for  
3                   conducting a biological process comprising suspended growth aeration on  
4                   wastewater, a gas supply system for introducing oxygen-containing gas  
5                   into the wastewater in the form of bubbles and causing at least a portion of  
6                   the oxygen in said bubbles to dissolve in the wastewater and at least a  
7                   portion of the dissolved oxygen to be consumed by the biological process,  
8                   wherein the oxygen so dissolved may comprise an excess or represent a  
9                   deficiency relative to the oxygen consumed by the biological process, and  
10                   wherein at least one gas collection member is positioned to receive offgas

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11 representing gas from bubbles that have not been not dissolve[[e]]d into  
12 the wastewater; said control system comprising:

13 A. at least one gas detector that can take measurements of the  
14 amount of at least one gas collected in the gas collection member,

15 B. at least one DO (dissolved oxygen) detector having a probe that,  
16 when in contact with the wastewater in the tank, can take  
17 measurements of the DO level of the wastewater, and

18 C. at least one controller containing or having access to code which  
19 the controller can utilize with said measurements to provide, in the  
20 control system, control values which are at least in part correlative  
21 with changing needs for the supply of dissolved oxygen to the  
22 wastewater.